*IN THE UNITED STATES PATENT AND TRADEMARK OFFICE*

Applicant: Neil HARRIS et al.

Title: LOUDSPEAKERS

Appl. No.: 09/435,354

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Examiner: Suhan Ni

Art Unit: 2643



**DECLARATION**
**UNDER 37 C.F.R §1.132**

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

I, Neil Harris, of Cambridge, England, declare that:

1. I am a co-inventor with Graham Bank in this application.

2. I graduated from the University of Cambridge, England in 1982 with a B.A. in Electrical Sciences, and was admitted to M.A. in 1985. I completed an external PhD program at the University of Essex in 2001, graduating in 2002. I am a member of the Audio Engineering Society.

3. I have worked in the electronics industry since graduating, specialising in DSP algorithm development at Ferranti Computer Systems and then Neve Electronics. I joined Mission Electronics in 1991, where I worked on digital-to-analogue converters, and provided general theoretical support for the R&D department. As Chief Scientist, first with Mission Electronics and now with New Transducers Limited (NXT), I am a co-inventor of the distributed-mode loudspeaker, and continue to work with the technology. My responsibilities include oversight of all theoretical research at NXT including CAE software, and liaisons with external academic organisations.

4. This application relates to a loudspeaker having a duct or wave guide for directing acoustic energy from a phase uncorrelated diffuse sound source to a termination that is remote from the sound source. An appropriate and useful definition of a wave guide or duct in this context is as follows: *A device which constrains or guides the propagation of waves along a path defined by the construction of the guide.*

5. The key feature of a duct or wave guide is that it "constrains" or "guides" the waves from the sound source to the remote termination. For this to happen it is necessary that the typical cross-sectional dimension (e.g., effective diameter) is smaller than the dimension in the direction of wave propagation. In other words, a duct or wave guide that usefully functions in this way should have a ratio of length to effective diameter that is about 1:1 or higher.

6. With regard to the "Ashworth" citation, the pathway by which sound may escape from the sound source cavity is formed by an arch-shaped aperture 7 in sounding board 3. In the example given (col. 3, lines 42-52) the sounding board is 16" square and 3/16" thick. Judging from the figures, the aperture is about 12" wide by 4" high in cross-section, with a cross-sectional area of about 44 $in^2$ (effective diameter of about 7.5"). The "length" of the aperture is 3/16" (the thickness of the sounding board), so the approximate ratio of length to effective diameter is 3/16" : 7.5", or 1:40. This is far less that the 1:1 or higher ratio that is needed for constraining or guiding sound waves. Thus the Ashworth aperture, in my opinion, is 40 times too shallow to constitute a duct or wave guide. It is not possible for so short a passageway to guide or direct the acoustic radiation. It is merely a hole or simple aperture through which the sound escapes, right at the source.

7. As noted above, our invention is directed at guiding sound from a diffuse radiation source to a remote location. The duct or wave guide is the device for transporting sound energy form the source to the region where it is required. For example, our speaker could be located in the trunk of an automobile, and a compact duct wave guide provided to transfer the sound energy to a convenient point in the interior, where this local source could be small and unobtrusive, leaving the larger speaker out of the way. Ashworth does not teach a duct or wave guide because his sound does not need to be directed anywhere; it is simply radiated proximate to his speaker box and the intrinsic sound panels as he clearly indicates.

8. Ashworth indicates that the transducer may be on any or both of the sound panels, so there is no design intention to distinguish the operation relative to the hole in the box. It is in any case very common to put holes in the back of speaker enclosures of all kinds to allow some of the useful sound energy in the box to be released to the ambient proximate to the box itself.

I further declare that all statements made herein on my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under section 1001 of Title 18 of the United States code, and that such willful false statements may jeopardize the validity of the application or any patent issuing thereon.

11th June 2004
Date

Neil Harris